DOCUMENT RESUME

ED 305 916 IR 013 775

AUTHOR Yoder, Sharon Burrowes; And Others
TITLE Logo and Equity: A Natural Partnership.
PUB DATE Jun 88
NOTE 9p.; Paper presented at the National Educational Computer Conference (Dallas, TX, June 15-17, 1988).
PUB TYPE Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Computer Literacy; *Computer Science Education; Equal Education; *Females; *Group Instruction; *Inservice Teacher Education; Junior High Schools; Minority Groups; *Programing; Teaching Methods
IDENTIFIERS *Cleveland State University OH; *LOGO Programing Language

ABSTRACT

In the fall of 1987, Cleveland State University in conjunction with Cleveland area schools and Logo Computer Systems, Inc., embarked on a series of workshops designed to train teachers in group learning techniques and Logo programming for use in computer training for junior high school girls or minorities. The first serious exposure to computing often occurs at the junior high school level. Unfortunately, computing is usually associated with mathematics, and research indicates that by the junior high age, many girls and underrepresented minorities have acquired a high level of math anxiety. In addition, the teaching style often used in such classes does not involve group work, when research shows that group learning is preferred by girls. Logo lends itself well to both group work and to the use of graphics and sound, which are also preferred by girls. Each workshop focused on both Logo programming and computer equity issues. The success of the project is being evaluated by both formative and summative techniques. This project can serve as a model for others wanting to train teachers in equitable use of computers in the classroom, and at the conclusion of the project, workshop materials that include techniques for teaching both Logo and group learning will be made available. (12 references) (EW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED305916

Logo and Equity: A Natural Partnership

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Direct all correspondence to:

Sharon Burrowes Yoder
Logo Computer Systems, Inc.
330 West 58th Street, Suite 5M
New York, New York 10019

Rosemary Sutton
Department of Curriculum and Foundations
College of Education
Cleveland State University
Cleveland, Ohio 44115

Elyse S. Fleming
Associate Dean
Department of Curriculum and Foundations
College of Education
Cleveland State University
Cleveland, Ohio 44115

Audio/visuals needed for the presentation:
Apple IIc, 128K IIe, or II GS
Large screen display, color preferred
Overhead projector

IR013775

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Sharon Yoder

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Abstract

There are few women and minorities who hold high paying positions in today's "high tech" job market. While the number of such jobs is likely to double within the next few years, it is unlikely that the number of women and minorities in those jobs will increase because they are currently underrepresented in computer courses at the secondary and university level.

The first serious exposure to computing often occurs at the junior high level. Unfortunately, computing is usually associated with mathematics, and research clearly indicates that by the junior high age, many women and under represented minorities have acquired a high level of math anxiety. In addition, the teaching style often used in such classes usually does not involve group work, when in fact research clearly shows that group learning is preferred by girls.

In the Fall of 1987, Cleveland State University in conjunction with Cleveland area schools and Logo Computer Systems, Inc. embarked on a project designed to train teachers in group learning techniques and Logo programming. Logo lends itself well both to group work and to techniques such a graphics and sound which are also preferred by girls.

By the spring of 1988. forty teachers and five "peer trainers" will have been trained. In the summer of 1988, another group of peer trainers and teachers will be involved in similar training. At the conclusion of this project, workshop materials that include both techniques for teaching Logo and group learning will be made available.

Needs

Futurists predict that the number of jobs in "high tech" will double in the next ten years (Siegel, 1984) If current trends continue, this increase in jobs will not provide much hope for women and underrepresented minorities who have traditionally been trapped in low-paying jobs. In 1984, women held only 31% of the challenging and high-paying jobs as computer systems analysts but represented 91% of key punch operators and 65% of the lower-paid and dead end jobs of computer operator and (U. S. Department of Labor, 1985)

Results of recent tests of high school and college students indicate that significant gaps remain in the mathematics and computer science achievement of males and females. Thus women will continue to be relegated to lower paying and dead end jobs because . Julian Stanley and his Johns Hopkins group report that males score significantly higher than females on the mathematics part of the SAT, the quantitative section of the Graduate Record Examination, and Calculus Advanced Placement Tests (Stanley, 1987; Brody, 1987). Test data show that males also score significantly higher than females on the computer science sections of the Advanced Placement tests and the Graduate Record Exam although males represent only 25% of those taking these exams.

The first formal study of computing typically occurs in the middle school/junior high years. It is during these years that girls' attitudes towards math deteriorate (Lockheed, Brooks-Gunn, Casserly & McAloon, 1985). Thus, these years are crucial for encouraging girls. Unfortunately most of this initial formal exposure to computers at this level focuses on the mathematical nature of the computer, further alienating girls who might otherwise choose to pursue additional courses in computing in high school. This is a particular loss if girls find their early computer experience unpleasant, discontinue study, and thus find many high paying and challenging career opportunities forever closed to them (Kersteen, Linn, Clancy & Hardyck, 1986).

The key to the problem of inappropriate presentation of computing lies in the characteristics of teachers who teach these initial courses. Most middle/junior high school teachers have little training in computer science beyond an introductory computer language course. This leads to teaching computing in a mechanistic, statement-by-statement manner. While these teachers may be aware of the greater involvement of non-minority boys with computing, they are not aware of possible strategies for dealing with this inequity. These teachers need assistance both to obtain a wider view of computer learning and computer careers and to develop new teaching strategies so that they can help non-mathematically oriented students broaden their horizons.

Seymour Papert, MIT professor and pioneer in introducing computer science concepts to children through the development of the language Logo and the book *Mindstorms* (1980), has recently concluded that teacher training is the key to preparing children for tomorrow's technological world (Papert, 1987). The Logo computer language provides a potential vehicle for increased involvement of girls and underrepresented minorities in computing. Not only does Logo make graphics, music and text manipulation easily available, but the Logo learning environment encourages group activities. Research indicates that girls are much more engaged by the creation of graphics and music and that group learning environments are much more comfortable for female students (Schuchat, Sanders & Stone, 1986) While there is a paucity of research on the mathematics achievement and computer learning of underrepresented minorities, the available evidence suggests that the strategies that encourage girls also encourage underrepresented minorities (Sadker, Sadker, & Klein, 1986; Sutton & Fleming, 1987)

Originally, Logo was devised to provide a "math world" in which mathematical ideas could be explored in a dynamic and exploratory fashion using "Turtle Graphics" (Papert, 1986a). The "Turtle Graphics" environment that is now a part of all Logos has "helped many children bridge the arts-science gap as they found that mathematical ideas could serve their aesthetic goals on the computer screen" (Papert, 1986b). The most recent

version of Logo, *LogoWriter,* provides "the material for new bridges connecting written text...into the network of all the other things children can do with their computers" (Papert, 1986b). *LogoWriter* provides a potential tool for involving girls and underrepresented minorities with the computer using techniques and learning styles they prefer while aiding them in overcoming their fears of mathematics.

More recently, a pilot project at Hennigan School in Boston suggests that girls can become involved with the computer through the use of manipulatives. In this project, *LogoWriter* was used as the vehicle to control toys made from traditional Lego building blocks. While girls' initial reactions were reserved, as the year progressed girls became more involved in the construction and control of Lego toys (Ocko, 1987).

The Project

In the fall of 1987, Cleveland State University in collaboration with the Cleveland Public Schools, Cleveland area school districts, and Logo Computer Systems, Inc. embarked on a training program designed to teach middle school teachers both *LogoWriter* and techniques for encouraging equitable use of computers in their classrooms. This project, funded by the Ohio Board of Regents through the Education for Economic Security Act of 1984, consisted of a series of Friday and Saturday workshops conducted throughout the 1987-88 school year.

The sessions were led by two instructors assisted by five peer trainers, each of whom was a practicing classroom teacher. These peer trainers had thorough knowledge of Logo programming and participated in a training session to increase their sensitivity to equity issues, prepare them to train teachers, and provide them with an overview of the project.

Each workshop focused both on equity issues and on learning Logo programming. Participants spent considerable hands-one time learning LogoWriter, exploring the Logo learning environment, and working on individual and group projects. Some aspect of

equity issues was addressed during each workshop using techniques that research has shown to be effective in encouraging girls and underrepresented minorities to become involved with technology. At some sessions, cooperative learning environments were modeled. Role model panels and career awareness activities made up part of other sessions. One full day was devoted to working with the Logo/Lego materials.

In addition to attending all workshop sessions, participants were expected to complete a number of projects including both programming projects and lesson plans that focused on using equity techniques in day to day classroom activities. At the end of the year-long training sessions, several of the participants will be selected to become peer trainers for the sessions to be held during the summer of 1988. By the fall of 1988, this multiplier model will result in the training of approximately 80 teachers and in leadership training for another ten.

The success of this project is being evaluated using both formative and summative techniques. Evaluations are given at the end of each workshop to assess the success of individual activities. Debriefing sessions with peer trainers and instructors further examine each activity, with a particular focus on anecdotal information. At the conclusion of the project, a larger scale analysis of the effect of the project on the participants and their students will be completed.

During the development of this project, a series of workshop notes have been developed. These notes, including information on how to present Logo workshops and techniques for enhancing the involvement of under represented minorities and girls in the use of computers, serve as a record of the workshops and provide guidelines to others wishing to offer a similar series of workshops in the future. These materials will be made available for dissemination at the termination of the grant in the fall of 1988.

Applicability to the Classroom

The techniques used during this teacher training project to teach teachers about the Logo learning environment and to encourage equitable use of the computer have been used successfully in a variety of environments and are equally useful in a classroom of middle-school students. Collaborative learning, a technique all too often overlooked by the traditional classroom teacher, encourages cooperation and learning by all.

The Logo learning environment encourages creativity, discovery, and appropriation of material by students. Girls respond positively to graphics and sound generation. Both of these are an integral part of the *LogoWriter* environment. Using Logo in a manner that is supportive of different learning styles is both natural and powerful and can result is much more success and positive feelings on the part of girls and under represented minorities.

Future

This project can serve as a model for others wanting to train teachers in equitable use of the computer in the classroom. Teachers learning both Logo and equity techniques return to their classrooms with ideas that will encourage all students to make the computer an integral part of their day to day lives.

Clearly, computers are going to be a part of everyone's future and it is therefore essential that we take seriously the training of each young person in our schools. Students who are comfortable with computers and computing are less likely to reject job opportunities that involve technology. Only if they feel comfortable with this emerging technology will every person, whatever gender or race, be able to take full advantage of the society into which they will graduate.

References

Brody, L. E. (1987, April) Sex differences on the GRE, MCAT, LSAT, and GMAT. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.

Kersteen, Z. A., Linn, M. C., Clancy, M., & Hardyck, C. (1986, April). Previous experience and the learning of computer learning: The computer helps those who help themselves. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Lockheed, M., Brooks-Gunn, J., Casserly, P., & McAloon, A. (1985, May). Sex and ethnic differences in middle school mathematics, science, and computer science: What do we know? Princeton, NJ: Educational Testing service, A Report submitted to the Ford Foundation.

Ocko, S. (1987, May). Learning as a reconstruction of knowledge: The Lego/Logo concept. Keynote address of the Great Lakes Logo Conference, Cleveland, OH.

Papert, S. (1986a, April) The next step LogoWriter. Classroom Computer Learning, 38-40.

Papert, S. (1986b). From the desk of Seymour Papert. A letter to LogoWriter licensees.

Sadker, M., Sadker, D., & Klein, S. (1986). Abolishing misperceptions about sex equity in education. Theory into practice, 25, 219-226.

Schuchat Sanders, J., & Stone, A. (1986). The neuter computer. NY: Neal Schuman.

Siegel, L. (1984). Researchers challenge: Portrait of a high-tech future. Infoworld, 5, (20), 31.

Stanley, J. C. (1987, April). Sex differences on the college board achievement tests and advanced placement examinations. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.

Sutton, R. & Fleming, E. S. (1987, February). EQUALS at Cleveland State University: 1985-6 evaluation report. Cleveland, OH: Cleveland State University.

U. S. Department of Labor. (1985). Employment and unemployment during 1984: An analysis. U. S. Department of Labor, Bureau of Labor Statistics.